

INTRODUCTION

Heart has two types of action

- ✓ **Mechanical** : Contraction & relaxation
- ✓ **Electrical** : Depolarization & repolarization

Mechanism of conduction

SA node → both atria → AV node → Bundle → ventricular wall

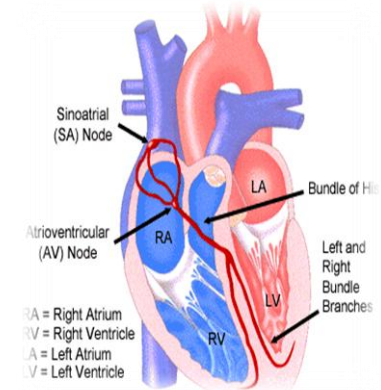
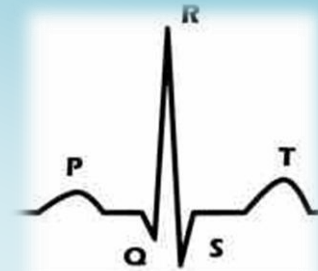
P wave : Atrial depolarization

QRS complex : Ventricular depolarization

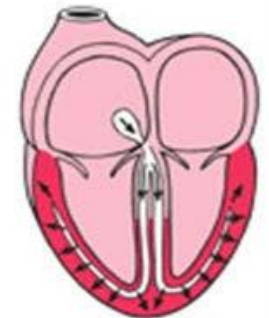
PR interval : AV conduction

T wave : Ventricular repolarization

N.B. Atrial repolarization is masked by QRS complex



Activation of the atria



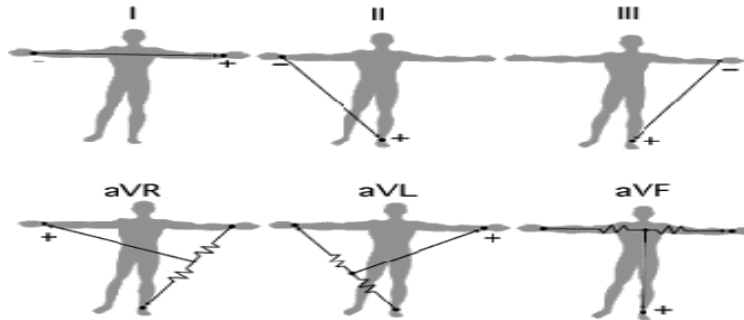
Activation of the ventricles

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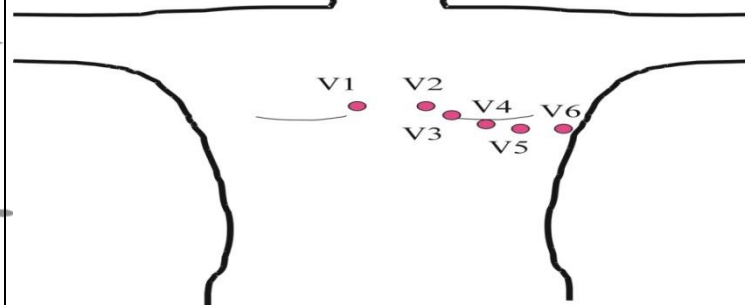
ECG LEADS

6 Limb Leads



AV = augmented voltage
AVR : inverted

6 Chest leads



Blood supply of the heart

Right coronary artery

Inferior wall

Topography → L II , L III , AVF

Left coronary artery

Anterior descending artery

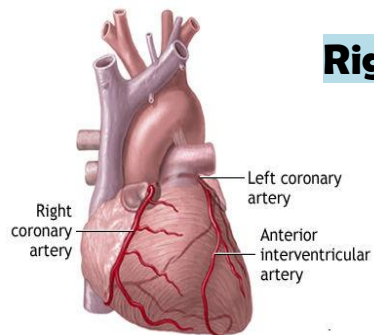
Anterior wall

V1,2,3,4

Circumflex artery

Lateral wall

V5,V6



1 small square = 0.04 sec.

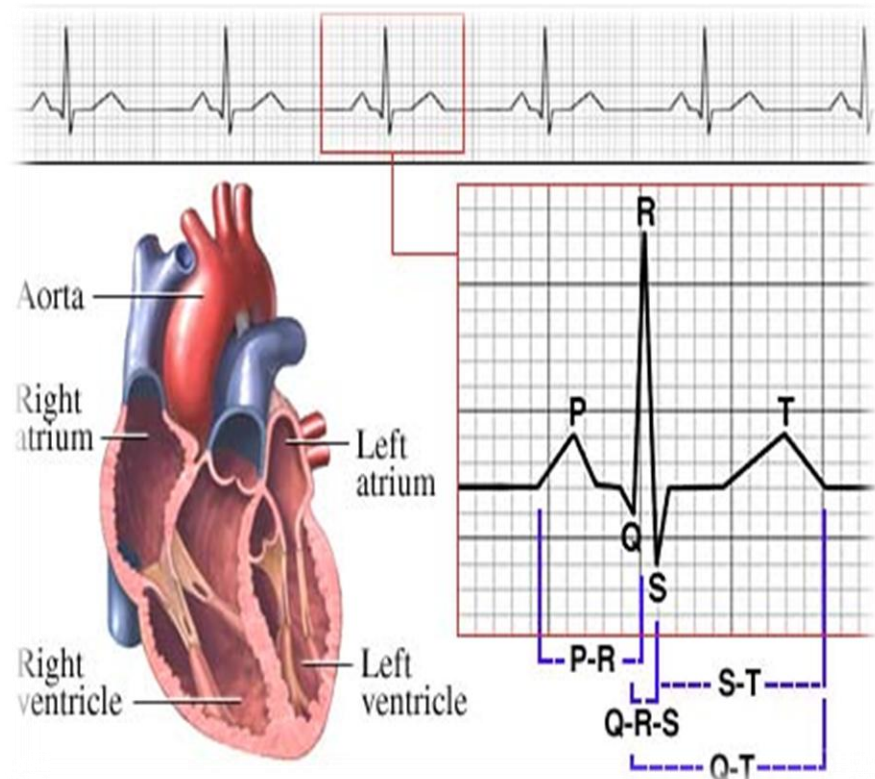
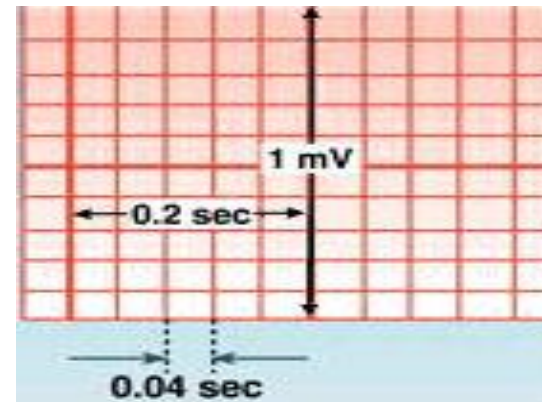
1 big square = 0.2 sec.

1 sec. = 5 big square.

1 minute = 300 big square.

Comment on ECG

- 1. Rhythm**
- 2. Rate**
- 3. Axis**
- 4. P Wave**
- 5. P-R Interval**
- 6. QRS Complex**
- 7. S-T Segment**
- 8. T wave**



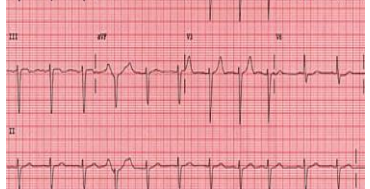
1. Rhythm

Regular	 ECG tracing of a normal heart rhythm.
Irregular	 In atrial fibrillation, the tracing shows tiny, irregular "fibrillation" waves between heartbeats. The rhythm is irregular and erratic.

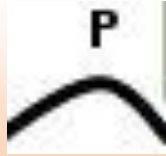
2. Rate

Regular	$\frac{300}{\text{R-R}}$ عدد المربعات الكبيرة بين R-R
Irregular	$\frac{300}{\text{R-R}}$ متوسط عدد المربعات الكبيرة بين R-R

3. Axis :

LI			
AVF			
	N.A.D.	Rt.A.D.	Lt.A.D.

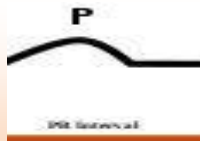
4. P Wave



Atrial depolarization
1st +ve wave before complex
L11.V1
less than (2.5 x 2.5) small ☐

- تمثل ايه
- اعرفها ازاي
- احسن مكان
- مقاستها

5. P-R Interval بداية وبداية



AVN conduction
L11
3-5 small ☐

- تمثل ايه
- احسن مكان
- مقاستها

- **N.B. : If > 5 small square = H.B.**

6. QRS Complex



Ventricular depolarization
Complex
Rt. Ventricle(V1,2) Lt .Ventricle (V5,6)

- تمثل ايه
- اعرفها ازاي
- احسن مكان

- **Q : 1st -ve in complex**
less than small ☐ : عرضها
- **less than 1/4 of next R** : عمقها

- **R : only +ve in complex**
2-3 small ☐ = عرضها
- **1-5 big** ☐ = ارتفاعها

7. S-T Segment نهاية وبداية



- تمثل ايه Ventricular repolarization
- Normally : Iso-electrical line as (P-R)

+ ST elevation :

- Recent MI
- Pericarditis (all leads)
- Variant angina

+ ST depression :

- Angina (Ischemia)
- Digitalis effect

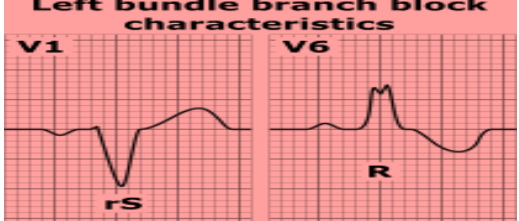
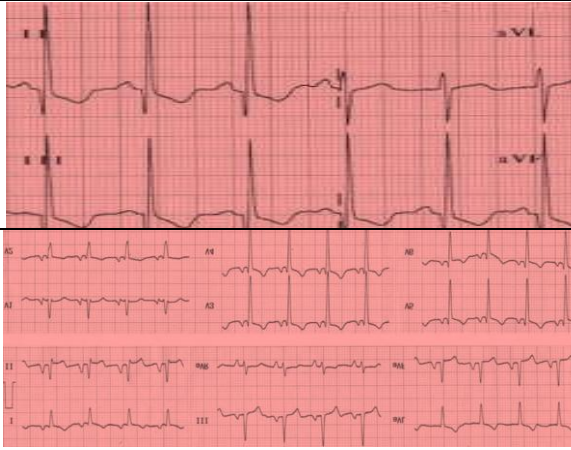
8. T wave NEVER ABSENT



- تمثل ايه Ventricular repolarization
- عرضها : Less than 6 small ☐
- ارتفاعها : Less than 1/3 R

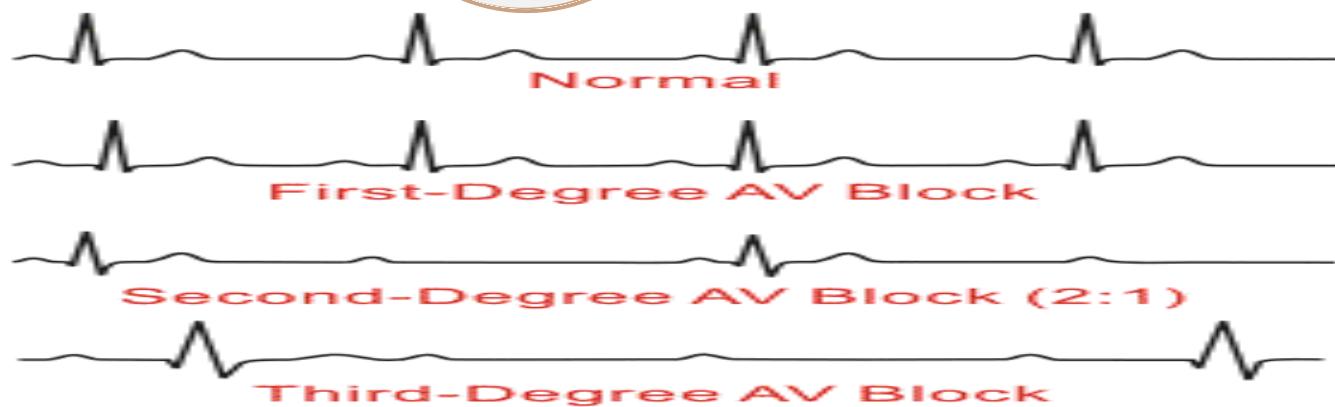
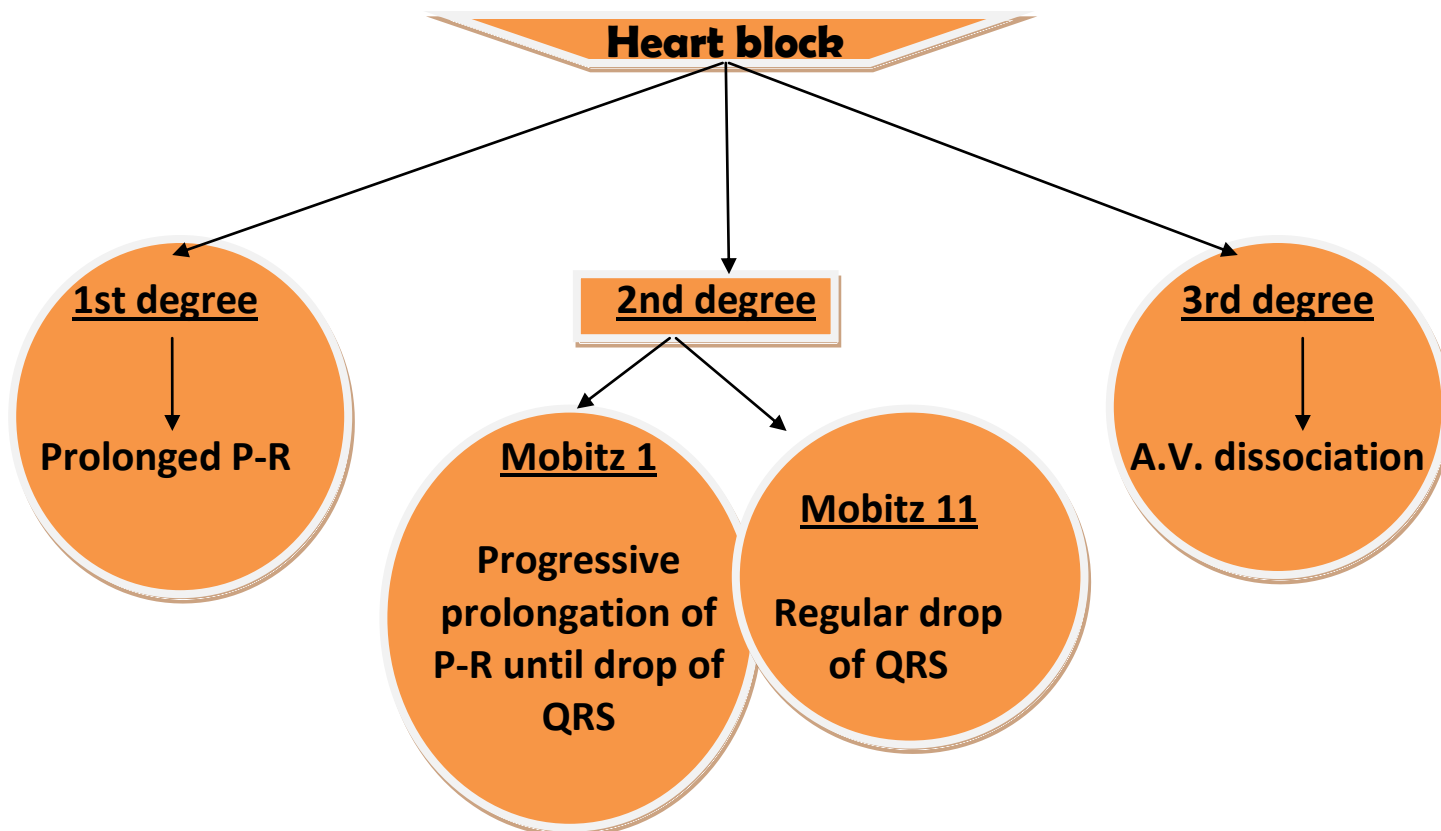
Tall T. (Himalaya T.) in hyperkalemia.

Abnormal ECG

Bundle branch block (BBB)	✚ If QRS notched • ($v1,2$ = Rt.BBB) • ($V5,6$ = Lt.BBB)	Left bundle branch block characteristics 									
Atrial ++	✚ P wave in LII , V1 ↗ Peaked > 2.5 = p. pulmonal ↘ Broad > 2.5 = p. mitral	<table border="1"> <thead> <tr> <th></th><th>Lead II</th><th>Lead V1</th></tr> </thead> <tbody> <tr> <td>Right Atrial Hypertrophy</td><td></td><td></td></tr> <tr> <td>Left Atrial Hypertrophy</td><td></td><td></td></tr> </tbody> </table>		Lead II	Lead V1	Right Atrial Hypertrophy			Left Atrial Hypertrophy		
	Lead II	Lead V1									
Right Atrial Hypertrophy											
Left Atrial Hypertrophy											
Ventricular++	<u>Normal S>r in (V1,V2) & R>s in (V5,6)</u>										
	✚ <u>Lt. Ventricular ++</u> = Exaggeration of normal : • deep S in $v1$ or 2 > 5 big square • Tall R in $V5$ or 6 > 5 big square • $R+S > 7$ big square • Strain ischemia in $V5$ & $V6$ ✚ <u>Rt . ventricular ++</u> = Revisable of normal : • Tall R in $V1$ or 2 • Deep S in $V5$ or 6 • Strain ischemia in $V1$ & $V2$										

Scheme for any segmented ECG

1- P wave in L II		Peaked → Rt.Atrim ++	
		Broad → Lt.Atrium ++	
2- QRS		V1,2	V5,6
	a- Shape (M notched)	Rt.BBB	Lt.BBB
	b- Direction	R>s = Rt.v++	S>r = Rt.V++
	c- Voltage	S> 5 big square = Lt.V. ++	R>5 big square = Lt.V ++
3- S.T. segment:			
Elevation {		All leads → pericarditis	
		ē topographism → recent M.I	
Depression {		All leads → sagging → digitalis effect	
		ē topographism → Ischemia	
4- Pathological Q: with topographism = old M.I			
5- Tall T.: All leads = hyperkalemia			



Rhythm

First
step:-

Regular

Irregular

2nd
step

Rate (60-100)

Normal (60-100)

Abnormal

- AF = Abscent P

- Extrasystole :
- الهبة وسط اخواتها

2nd HB (Mobitz I)

